



HONOLULU
LA JOLLA
MONTEREY
TIBURON

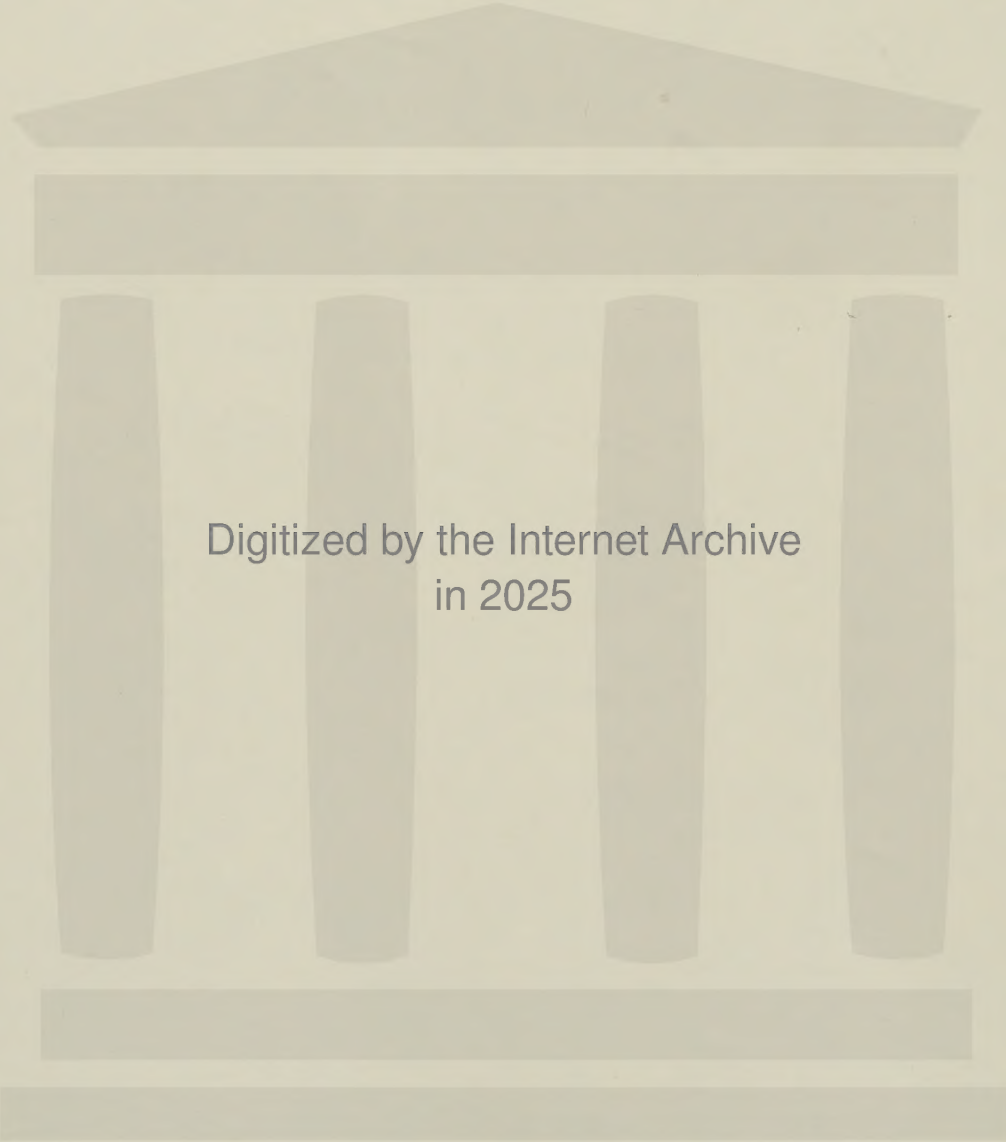
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SWFC

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - JUNE 1977

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SOUTHWEST FISHERIES CENTER
LA JOLLA, CALIFORNIA

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY
PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - JUNE 1977

STATUS OF PUBLICATIONS

Published

Barham, Eric G., Warren K. Taguchi, and Stephen B. Reilly. 1977.
Porpoise rescue methods in the yellowfin purse seine fishery and
the importance of Medina panel mesh size. Mar. Fish. Rev. 39(5):
1-10. (Also MFR Paper No. 1246.)

Introduction of the porpoise releasing method known as "back-down" by Anton Missetich and Manuel Neves and the development of small-mesh porpoise safety panels by Harold Medina raises the question of the optimum mesh size for the panels. Medina panels of relatively standard dimensions hung from 2-inch mesh webbing had been installed in about half the nets of the U.S. tuna purse seine fleet before passage of the Marine Mammal Protection Act. The fishermen believed, and several statistical studies indicated, that use of the panel resulted in lower porpoise mortality. Despite the improved performance, however, porpoises were still being entangled in nets during the backdown process and a recent study indicates that up to 30 percent of porpoise mortality is due to this factor. Using mainly porpoise specimens taken in the fishery, measurements of penetration of porpoise snouts and flippers through mesh openings of 2, 1-7/8, 1-1/2, and 1 inches were made to elucidate the potential reduction in porpoise entanglement that could be expected through use of Medina panel mesh sizes of less than 2 inches. With their jaws closed, the snouts of even the smallest specimen could not penetrate 1-inch mesh, and the average penetration with the jaws open was grossly reduced as were penetrations of pectoral fins. Because of added weight and drag, additions of large sections of small-mesh netting can drastically affect the buoyancy and hydrodynamic performance of

This report does not constitute publication and is for information only.

purse seines. Recent tests of porpoise "aprons" and "chutes" (trapezoidal-shaped sections of webbing appended to Medina panels) promise a means of making small-mesh netting compatible with tuna purse seine performance.

Colebrook, J. M. 1977. Annual fluctuations in biomass of taxonomic groups of zooplankton in the California Current, 1955-59. Fishery Bulletin, U.S. 75(2): 357-368. (Dr. Colebrook, Institute of Marine Environmental Research, Plymouth, England) conducted the research and wrote the paper during a stay of several months duration at the La Jolla Laboratory in 1975.

Year-to-year fluctuations in the abundance of the zooplankton of the California Current region, from 1955 to 1959, have been studied. The abundance of zooplankton was measured in terms of the biomass of each of 17 major taxonomic categories (generally Class or Order). Principal components analysis was used to produce concise descriptions of the major elements of the fluctuations in the abundance of the categories in each of 14 areal subdivisions of the survey area. Considerable coherence with respect to annual changes was found both between the taxonomic categories and between the areas. The principal common element in the fluctuations could be associated with a marked increase in the temperature of the surface waters which occurred in 1957 and persisted through 1958 and 1959. A less pronounced but still quite clear common element in the fluctuations could be associated with year-to-year fluctuations in the amount of coastal upwelling in the area.

Maxwell B. Eldridge. 1977. Factors influencing distribution of fish eggs and larvae over eight 24-hr. samplings in Richardson Bay, California. Calif. Fish and Game 63(2):101-116.

To determine the factors affecting the day-night distribution of ichthyoplankton, a series of eight 24-hour samplings was conducted in Richardson Bay, California. Slightly modified channel nets were fished in two locations and collections made for each half-tide stage. Of the different larval taxa collected, Clupea harengus pallasii, Engraulis mordax and Gobiidae comprised 98% of the total catch. The most speciose family was Cottidae.

Densities of larvae and eggs were positively correlated with tide stages of the fastest currents and with night conditions. Analysis of the catch results suggests the most determinant factor in the distribution of eggs and larvae is tidal currents.

Interesting occurrences of 10 species of offshore spawned larvae is reported, and a possible explanation for their presence within the bay is discussed.

Sharp, Gary D. and Ronald C. Dotson. 1977. Energy for migration in albacore, Thunnus alalunga. Fishery Bulletin, U.S. (Note) 75(2): 447-450.

Laurs, R. Michael, Heeny S. H. Yuen and James H. Johnson. 1977. Small-scale movements of albacore, Thunnus alalunga, in relation to ocean features as indicated by ultrasonic tracking and oceanographic sampling. Fishery Bulletin, U.S. 75(2): 347-355.

Studies with ultrasonic tracking techniques and oceanographic sampling demonstrated that oceanographic conditions play an important role in the local concentrations and movements of albacore, Thunnus alalunga, in U.S. coastal waters. Albacore show a tendency to congregate in the vicinity of coastal upwelling fronts, presumably to feed. They move away from the immediate area when upwelling ceases and the upwelling front is no longer present at the surface. The movements of albacore also appear to be related to the distribution of sea surface temperature, with fish spending little time in water with surface temperatures cooler than 15.0°C.

The average swimming speed for three fish tracked between 27.8 and 50 h was 1.6 knots (82.4 cms) with each fish exhibiting slightly faster swimming speeds during hours of daylight than during hours of darkness.

Smith, P.E. 1977. The effects of internal waves on fish school mapping with sonar in the California Current area. Rapp. P.-v. Reun. Cons. Int. Explor. Mer., 170: 223-231.

Sonar mapping of schools of fish in surface waters where echosounders are ineffective is influenced by changes in the effective range of detection caused by changes in the sound velocity profile as well as by vertical migrations and changes in packing density within the schools.

Analysis has been made of 38 sound velocity profiles over a short period in one region and their variation compared with that in a mass of data for the California area; the short-term variation was of comparable magnitude to that over a 20 year period, with effective detection range varying five-fold. As analysis of the sound velocity profiles at each school mapping station is impractical, a statistical approach is made to determine an 'average' effective detection range. This utilizes historical data, partitions areas and seasons according to intensity of variation in the sound velocity data, allocates sound velocity profiling so as to reduce the standard error of the mean sound velocity gradients in upper waters to a uniform value for all areas and seasons and then, for these profiles, creates a probability diagram for corrections to the number of targets detected at various ranges and depths. An example of the application of the method is given.

Approved by Center Director

Sakagawa, Gary T., Atilio L. Coan and Ted C. Murphy (La Jolla Laboratory). A review of the yellowfin-skipjack tuna fishery of the Atlantic Ocean and American participation, 1956-1975. For publication in Marine Fisheries Review.

Theilacker, Gail H. (La Jolla Laboratory). Effect of starvation on the histological and morphological characteristics of jack mackerel larvae, Trachurus symmetricus. For publication in the Fishery Bulletin, U.S.

Yuen, Heeny S. H (Honolulu Laboratory). NMFS research on Pacific billfishes. For publication in Official Program, Nineteenth Hawaiian International Billfish Tournament, Kailua-Kona, Hawaii, August 1977.

Chess, James R. (Tiburon Laboratory). An airlift sampling device for in situ collecting of biota from rocky substrata. For publication in Marine Technology Society Journal.

HONOLULU LABORATORY

RESOURCE ASSESSMENT AND DEVELOPMENT INVESTIGATIONS (RADI)

Fishery Management Research Task Researchers
Working on Various Management Plans

A major function of the Fishery Management Research Task at the Honolulu Laboratory is to develop quantitative assessments, numerical models and optimization techniques for fishery management policy analysis, particularly in relation to fishery management problems in the central and western Pacific Ocean. During June, Task researchers accomplished several important jobs related to the management of Pacific billfishes, spiny lobsters and precious corals.

Under the supervision of Task Leader Jerry Wetherall, Operations Research Analyst, Bill Lovejoy completed the design, coding, debugging and documentation of a multi-compartment computer model describing the dynamics of a 3-species, 2-gear fishery system. The model will be used to simulate the space-time behavior of tuna and billfish stocks around Hawaii, and to evaluate a series of hypothetical restrictions on the foreign pelagic longline fleet with respect to their impacts on the fish stocks, yield, economic return and domestic-foreign fleet conflict indices. Mr. Lovejoy is now constructing a migration submodel for the simulated tuna and billfish stocks.

As members of the Spiny Lobster Management Planning Team of the Western Pacific Regional Fishery Management Council (WPRFMC), Mr. Howard Yoshida, Fishery Biologist, Dr. Roy Mendelssohn, Operations Research Analyst and Research Assistant Kristin Stahl worked during June to assemble and evaluate information on the biology, catch and economic value of spiny lobsters in the main Hawaiian Islands chain and in the Northwestern Hawaiian Islands (NWHI). A first-draft Fishery Management Plan is scheduled for completion in mid-July.

A precious coral Fishery Management Plan is also in preparation. As a contribution to this plan, Dr. Wetherall and Mathematician Marian Yong are evaluating the effects of alternative harvest policies on the productivity of the Makapuu bed pink coral stock and on yields and economic value. The aim of the analysis is to compare constant yield policies with a variety of economically advantageous pulse-fishing strategies.

Townsend Cromwell Returns from Northwestern Hawaiian Islands Survey

Richard N. Uchida, Leader of the Insular Resources Task at the Honolulu Laboratory, reported that the NOAA research vessel Townsend Cromwell returned to Honolulu on June 27 after completing a survey of the demersal and pelagic fishery resources over seamounts, banks, and offshore grounds in the NWHI. The scientific field party on the cruise included Mr. Reginald Gooding, Chief Scientist, Research Assistants Paul Shiota, Robert Moffitt, Darryl Tagami, Glenn Higashi and Martina Queeneth, and Cooperating Scientists Jayne Fitzgerald and Douglas Davies from the University of Hawaii's Marine Options Program.

Mr. Gooding reported that exploratory bottom trawling, fish and lobster trapping and bottom handlining were conducted during the cruise and that approximately 1,500 spiny lobsters, most of which were caught around Maro Reef and Laysan Island, were tagged and released.

Capture of a Small Bonito in Shallow Water Reported

Fishery Biologist Thomas Hida at the Honolulu Laboratory reported that he caught a bonito, Sarda orientalis, while he was doing some recreational fishing in Kahana Bay, a small, picturesque bay on the windward coast of Oahu. The bonito, which measured less than 31 cm, was taken on June 8 in a gill net of 63.5 mm (2.5 in) mesh size in water a little over a meter deep. Mr. Hida does not believe that there are many, if any, documented records of the capture of this species in such shallow water in Hawaii. He is planning to write a short note for publication on the capture of this specimen and has begun a literature search on the subject.

Final Draft of Tripartite Cooperative Study
of the NWHI Awaits Approval

Dr. Robert Skillman, Leader, Resource Monitoring and Assessment Task, reported that the final draft of the formal agreement for the cooperative study of the Northwest Hawaiian Islands is being reviewed at the highest levels of each of the participating agencies. While no serious objections have arisen, the document has not been formally signed as yet. Since the Hawaii Board of Land and Natural Resources has approved the agreement, subject to approval by the State Attorney General, the first joint cruise to be undertaken by the Honolulu Laboratory, Hawaii Division of Fish and Game and the U.S. Fish and Wildlife Service will depart as scheduled on July 4.

Hawaiian Skipjack Tuna Catch Prediction Issued

The Honolulu Laboratory annually issues a prediction of the total Hawaiian skipjack tuna catch in the early part of the year at the request of the local canning industry to aid them in their planning of plant operations. This prediction is based on a statistical relationship between annual catches of skipjack tuna and temperature and salinity changes due to advection during the early part of the year in waters off Oahu. While there has been little or no trend in the 1977 salinity record, the warming trend this year appears to have started early in the season. Using the start of the warming trend estimated at 28-29 December, a catch of 5,785 metric tons is predicted for the Hawaiian skipjack tuna fishery. This predicted catch is well above the long-term average of about 4,000 metric tons.

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Mr. Tamio Otsu, Chief, RADI, completed translating a recent publication on the Japanese commercial trawl fishery on the central North Pacific seamounts for pelagic armorheads and alfonsons. This paper presents catch and effort statistics on the commercial fishery on several of the seamounts located between the Emperor and Hancock Seamounts. The paper indicates that the Japanese commercial trawlers are taking between 20,000 and 30,000 metric tons of seamount groundfish, predominantly pelagic armorhead, from the area each year. However, there has been a marked decline in the catch rates over the last few years.

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Mr. Uchida completed drafting cruise plans for a charter cruise on the Easy Rider (ER 77-02, Part II) and plans for Part II, Townsend Cromwell Cruise 77-03, which began September 10 and ends November 7 and which will involve environmental monitoring work and demersal and pelagic fish and shellfish surveys in the NWHI. Mr. Uchida also completed drafting specifications for a contract to develop a comprehensive economic profile of the Hawaiian fisheries for spiny lobsters, snappers and groupers.

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After a review of Honolulu Laboratory's teleterminal equipment and operations, a decision was made by the ADP group to purchase a DECwriter II printing terminal and a Teleray CRT terminal to replace the equipment leased from the Hawaiian Telephone Company.

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Mr. Ray Sumida of the ADP group reported that work is continuing on processing the billfish data obtained from the local fishing industry. The work is two-thirds complete. Mrs. Sally Kuba continues programming to obtain printouts of billfish data summarized in various formats.

The ADP group also met with Dr. C. W. Getz, Regional Commissioner, GSA, regarding various ADP matters in the Hawaii area. Among the more interesting items discussed during the meeting was the GSA contract awarded to Potomac Research Inc. to provide analysis, programming, and related services in the Hawaii area.

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A small sample of spiny lobsters from the NWHI has been forwarded to Dr. James Shaklee, Zoology Department, University of Hawaii for a determination of isoenzyme systems for subpopulation studies.

Dr. Skillman drew up contract specifications for the evaluation of current fishery statistical systems in Hawaii, Guam, American Samoa, and the Northern Mariana Islands, their modification or the design of new systems based on management needs.

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Research Assistants Thomas Kazama and Robert Humphreys made preparations to depart Honolulu for French Frigate Shoals where they will board the Easy Rider for a charter cruise around the NWHI. During the cruise they will be conducting gear competition and "ghost" fishing experiments with lobster pots. Mr. Kazama will be Field Party Chief on the cruise.

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Mr. Hida met with Mr. Don Meyers, a local architect, for consultation on remodeling one of Honolulu Laboratory's annex buildings to provide more laboratory space to process plankton and trawl samples. Mr. Hida also has been making plans to coordinate the training activities for a fishery trainee from Papua, New Guinea, Mr. Arahaz Vala, who will be in Honolulu for about 9 months.

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Fishery Biologist James Uchiyama, Honolulu Laboratory, supervised the relocation of the otolith laboratory to another room in the building and began training Research Assistants Jeff Sampaga and Jose Enitan to process and read otoliths. He also instructed newly hired Research Assistant Michael Smith and Mr. Clarence Hookala on making field biological observations. Mr. Hookala was hired by the WPRFMC to serve as an observer on the Pacific Trojan, which will be fishing for spiny lobsters in the NWHI. Mr. Uchiyama also collected catch and effort statistics from the Libra, Jinita and Pursuit. He also held discussions on spiny lobster catch statistics with Mr. Henry Okamoto, Hawaii Division of Fish and Game, and with Dr. Gary Sakagawa, SWFC La Jolla, and Dr. Leighton Taylor of the Waikiki Aquarium on age and growth analysis using otoliths.

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The Honolulu Laboratory staff has completed the first draft of plans and schematic drawings for the midlife major refurbishment of the Townsend Cromwell. These plans are for the redesign of the scientific laboratory spaces, storage areas adjoining the forward deck work area and the stern.

Estimated 1977 Hawaii Landings of Skipjack Tuna Continue Above the Long-Term Average

The May 30 to June 26 Hawaii landings of skipjack tuna were estimated at 341.3 metric tons (MT), which is 505.7 MT below the landings for the same period in 1976 and 347.8 MT below the 1948-1976 long-term average for the same period. The cumulative landings from January through June 26 were estimated at 1,809.3 MT, which is 115.8 MT below last year's landings for the same period and 83.0 MT above the 1948-1976 long-term average for the same period.

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Pulou Niutoa, employee of the Government of American Samoa, measured 775 albacore from 21 vessels during the period from May 16 to June 15. He also collected 24 sets of catch and effort data. Utilizing data from 5 vessels, the average size of albacore for the period was 89.1 cm and the catch rate averaged 1.89 albacore per 100 hooks.

FISH-ENVIRONMENT INVESTIGATIONS (FEI)

First Definitive Laboratory Evidence of Physiological Thermoregulation in Fish Reported

Dr. Andrew E. Dizon, Leader of the Experimental Ecology of Tunas at the Honolulu Laboratory, and Mr. Richard W. Brill, Graduate Student, Department of Physiology, University of Hawaii, report the first definitive laboratory evidence of physiological thermoregulation in fish. The evidence was obtained in experiments to determine the thermoregulatory abilities of yellowfin tuna; six fish have been tested to date.

In the experimental procedure, the test fish are exposed to a water temperature schedule of 25°, 20°, 30°, 20° and 25°C; each treatment temperature period is 12 h. Deep red muscle temperatures are measured on the free-swimming fish by a temperature sensitive ultrasonic transmitter, and swim speed is continuously recorded over the 60 h experimental period.

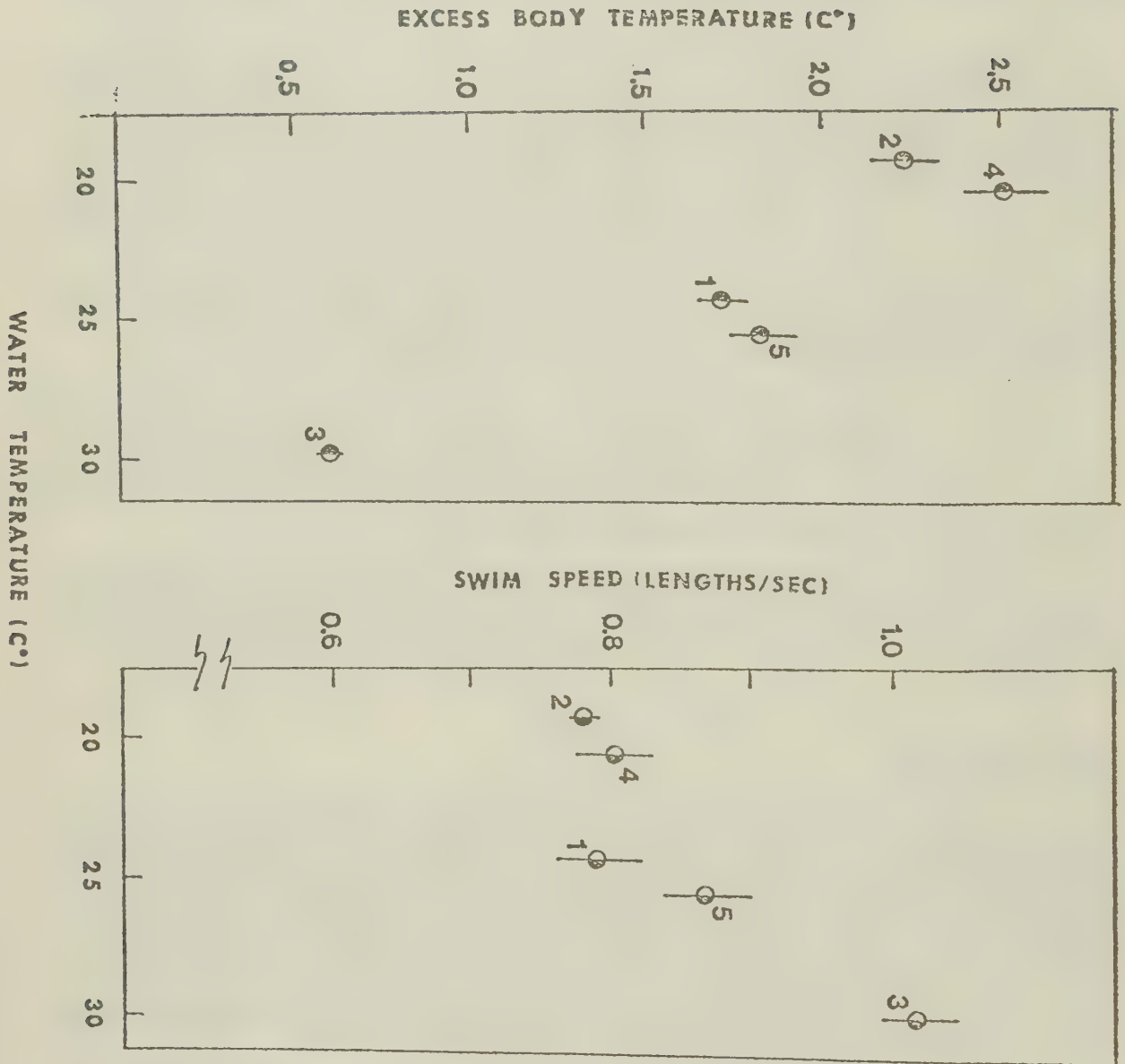
In June, a fish 66.4 cm long, weighing over 6 kg (6,047 g) was tested. This fish was considerably larger than the other fish tested to date (ca. 45 cm). The data from this fish were fully compiled and the results are striking. As temperature of the test water increased, the deep body temperature decreased! As can be seen in the attached figure, the excess body temperature of the fish was about 2.4°C above the water temperature in the tests at 20°C; at 30°C seawater temperatures the excess was only about 0.6°C. At 25°C the excess was intermediate. It can also be seen that tests at 25°C, although 36 h apart, show the fish's temperature to be virtually the same. (The small numerals adjacent to the values are order of temperature treatments; 95% confidence limits are also indicated.)

Heat production in a swimming fish is related to approximately the cube of velocity. Although the test animal increased its swim speed by approximately 20%, its body temperature excess decreased by 500%. Also, at the two 25°C temperature treatments 36 h apart, the body temperature is virtually the same while swim speeds are significantly different.

Clearly then, the yellowfin tuna is able to regulate body temperature excesses independently of activity. It is suggested that this is strong evidence of a true, albeit primitive, physiological thermoregulatory response.

Preliminary Plan for a Seamount Ecosystem Study Completed

Dr. Richard Barkley, Chief, Fish-Environment Investigations at the Honolulu Laboratory, completed a preliminary plan for a seamount ecosystem study, including charts of seamount locations and sea surface currents for the Center management meeting this month. He also prepared a set of histograms showing seamount least depths for various regions; these show that seamounts with least depths of 200 to 300 fathoms are the least abundant (2 to 4%), compared to banks of depths less than 100 fathoms (8%) and deeper seamounts 600 to 1,000 fathoms deep, which make up about 40% of the total number of shallower seamounts of the North Pacific.



LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ALBACORE FISHERIES INVESTIGATION PROGRAM

Albacore Forecast for 1977 Season Issued

The NMFS albacore forecast for the 1977 season and cooperative albacore research activities were issued in June. According to Dr. Laurs, Leader of the Albacore Fishery Investigation Program, it appears that a major portion of the U.S. albacore catch during the 1977 season will be taken off central and southern California and southward to Guadalupe Island. It is estimated that approximately 60% of the total catch will be taken in waters south of San Francisco and 40% in waters to the north. This is similar to the distribution of catch made during the 1976 fishing season.

The results of minimal pre-season scouting and the apparent relatively late development of the offshore portion of the Japanese live-bait fishery in the vicinity of the Emperor Seamount chain just west of 180° suggest that at least a portion of the migration of albacore to the North American west coast may be late in arriving this season. This may be the case especially for fish entering waters off the Pacific Northwest. Good early-season fishing, however, is expected off southern California southward to about Guadalupe Island. Fishing in the offshore waters between 135° to 145°W and 32° to 35°N is expected to be good during early season this year. Strong temperature fronts are present in the offshore area which should aid in concentrating fish. These strong temperature frontal conditions may also contribute to a late arrival of fish nearshore if fish spend time feeding in the offshore waters.

The outlook for sportfishing off southern California is good and a few boats have already caught albacore southwest of San Diego.

In order to aid the U.S. albacore fleet develop their fishing strategy, the American Fishermen's Research Foundation has selected the Lady Olga, Lusty and Four Seas to conduct albacore scouting activities during the 1977 season. The Lady Olga sailed from Santa Barbara on June 15 and conducted scouting activities off southern California to Guadalupe Island area. The Lusty and Four Seas will begin their cruises on July 5 and 13, respectively, and will work in waters from central California and northward. These vessels will also tag albacore and make oceanographic and meteorological observations

Daily broadcasts of albacore fishing information will also be prepared by the La Jolla Laboratory and will be transmitted over marine and commercial radio bands again this year. The broadcasts will be made twice daily on weekdays and once on Saturday mornings from July 11 through October 31, or

until the albacore season ends. The broadcasts will include the latest albacore fishing information obtained from research vessels, cooperating fishing vessels, unloading station operators and other sources. Highlights will include location of active centers of fishing, typical fishing scores, size of fish, sea surface temperature and subsurface temperature information when available, and other information as appropriate. Sportboat albacore fishing activity will also be included. A weather and sea features, regional wind, weather and sea state conditions between 20-250 miles offshore and storm development. NMFS will also transmit weekly charts of sea surface temperature via radio facsimile over radio station WWD.

Nearly coast-wide reception of the albacore fishery advisory broadcasts will be available this year. The broadcasts will be transmitted by 1) radio station WWD, which is licensed to the NMFS and located on the Scripps Institution of Oceanography (SIO) campus at La Jolla, California, 2) Coast Guard radio station NMC at Point Reyes, 3) radio station KRED in Eureka, California, 4) radio station KNPT in Newport, Oregon, 5) KAST in Astoria, Oregon and 6) probably a station in Coos Bay, Oregon.

Albacore Oceanography Cruise Completed

The NOAA research vessel Jordan conducted a 28-day albacore-oceanography cruise June 8 to July 5. Ron Lynn, Oceanographer, was Chief Scientist. The objectives of the cruise were: 1) to improve the understanding of the physical processes involved in the frontal boundaries of the Transition Zone in the eastern North Pacific, and through this understanding provide a basis for relating these processes to the distribution and relative abundance of albacore during the early-season onshore migration, and 2) to examine the feasibility of using satellite observations to monitor the changes in ocean characteristics that influence the spatial and temporal distribution and relative abundance of albacore.

Primary activities on the Jordan centered on the oceanographic studies of the subtropic and subarctic front. A broad survey was conducted to locate and map the frontal boundaries. In past surveys fronts characteristically showed horizontal salinity gradients of 0.3 and 0.4 ppt in 5 nautical miles, and extended to depths of 140 to 200 meters. A horizontal temperature gradient of 0.5 to 1°C accompanied the salinity change. During this survey the subtropic and subarctic fronts were very poorly developed. Small fragments of the fronts were found in scattered locations. The fronts near the sea surface were frequently displaced from the deeper manifestations of the front.

Seven satellite-monitored drifters with drogues attached were deployed in the various water mass regions and across the fronts. These drifters, designed by the National Data Buoy Office and built by Polar Research Laboratories, use the Nimbus G satellite and the same principals as the SATNAV system. Signals picked up by satellite are processed by NASA's Goddard Space Flight Center, Greenbelt, Maryland. In addition to position,

surface temperature and the presence of the drogue are monitored. The original objective was to measure the current patterns about the fronts especially a jet-like feature that usually appears in the salinity distribution. The poor development of the fronts forced changes in the deployment plan. A broad spread across the survey pattern was used. These drifters have window-shade drogues which are very simple to deploy. Routine deployment took about 5 to 10 minutes.

The Jordan trolled for albacore on a time-available basis and caught 124 albacore. During the first half of the cruise considerable sunshine and lack of wind caused high surface temperatures (approximately 20°C) and a near-surface thermocline. When this condition prevails fishing success (by jigs) drops markedly. Jordan catches were very scattered.

The frequent clean days should provide opportunities to find good satellite imagery data, however, the elevated surface temperatures and lack of a mixed layer may disguise what frontal patterns existed. Examination of this data will start next month.

Initial Use of H-P System Controller and STD Successful

The albacore oceanography cruise marked the first use of the Hewlett-Packard system controller on-line to the STD (CTD). Overall, the H-P system functioned extremely well during Jordan cruise 111. The primary purposes:
a) to monitor the magnetic tape recording of STD data in real-time and
b) to process data at sea, were accomplished.

Despite the brief time available for system setup and programming prior to the cruise, they obviously departed with adequate preparations. The initial system control and data collection programming was a major task. Credit for this accomplishment goes to Tracor (Greg Elmassian). The data processing, plotting routines and the modification and application of the Tracor programs was notably accomplished by Ken Bliss.

During the cruise, major problems occurred with the STD and CTD units. All three units malfunctioned or failed; ultimately one unit was cannibalized to make another functional. Except in the two instances when a station was abandoned because of sensor instrument failures, the H-P system recorded data (good or bad) for all stations. (Approximately 20% of the STD/CTD stations will require extensive calibration corrections or data editing to overcome problems caused by the sensor instrumentation problems.)

There were several minor problems that occurred in the H-P system. None of these caused any data loss and each was overcome by program manipulation. The system is now being examined by Hewlett-Packard under their warranty.

MULTISPECIES TAXONOMY PROGRAM

Ahlstrom Honored at ASLO Meetings for Charter Members

June 20 to 23, Senior Scientist E. Ahlstrom attended the annual meeting of the American Society of Limnology and Oceanography at Michigan State University in East Lansing, Michigan. ASLO, founded in 1936, honored its 24 remaining charter members at this meeting. About half of the charter members were in attendance, including Dr. Ahlstrom.

Moser Teaches Course in Ichthyoplankton Biology at USC's Catalina Marine Science Center

During the week of June 27 to July 1, Fishery Biologist H. Geoffrey Moser participated in teaching a course in ichthyoplankton biology at the University of Southern California's summer session at their Catalina Marine Science Center. Dr. Moser's contribution to the course was to give the students a systematic survey of marine fish eggs and larvae.

Each morning, Dr. Moser presented a 1-1/2 hour lecture and supervised the study of life history series each afternoon. All the common kinds of fish larvae likely to be encountered off southern California were studied. The total course was 5 weeks in duration; Dr. Robert Lavenberg of the Los Angeles County Museum of Natural History was the principal instructor. The main thrust of the course was observation, collection and rearing of the eggs and larvae of shorefishes. The course was attended by 15 graduate students.

Indian Scientist Arrives for Study at La Jolla Laboratory

On July 2, Mrs. C. B. Lalithambika Devi arrived from the National Institute of Oceanography in Cochin, India, to work with Dr. Elbert H. Ahlstrom, Senior Scientist at the La Jolla Laboratory, for 4 months. Mrs. Devi specializes in life history studies of flatfishes, particularly flatfishes of the subfamily Bothinae. The extensive collection of flatfishes made on Scripps Institution of Oceanography's Naga Expedition to the Gulf of Thailand and the East China Sea are available for study. Mrs. Devi also plans to take the training course on identification of fish eggs and larvae to be given by Dr. Ahlstrom September 12 through October 7.

Twenty-four persons have been accepted into the 4-week intensive training course on the identification of fish eggs and larvae which will begin at the La Jolla Laboratory on September 12. This is the maximum number that can be accommodated and there have been many more requests than there were spaces available.

Much of the background material for the course is being prepared. The 216 life history series to be studied in the course--12 kinds per day during 18 days--are the same as last year, except for a few substitutions. Thanks to the work of Henry Orr and Barbara Sumida, illustrations will be available for several additional life history series.

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Work continued on identification of CalCOFI collections obtained during the 1975 CalCOFI year. About 2/3rd's of the samples obtained during the cruises made in 1975 have been examined and the larval fish identified. Work also continued on the preparation of several manuscripts. The charts to be used in the CalCOFI Atlas dealing with the distribution of rockfish larvae are being prepared and this atlas should be completed within the next 2 months.

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Fishery Biologist John Butler presented a paper entitled, "The genus Cubiceps, family Nomeidae," at the annual meeting of the American Society of Ichthyologists and Herpetologists in Gainesville, Florida on June 23.

LARVAL FISHES, COASTAL EASTERN PACIFIC PROGRAM

Experiments Continue on Effect of Ultra-Violet Radiation on Fish Eggs and Larvae

Dr. John Hunter, principal investigator for an Environmental Protection Agency project at the La Jolla Laboratory on the effect of ultra-violet radiation on the eggs and larvae of the northern anchovy, Pacific mackerel and other fishes, reported this month that construction of a second apparatus for testing UV-B effects in the marine aquarium was completed and calibrated with a Robertson-Berger sunburn meter. Experiments for determining the threshold for effects of UV-B (287 to 320 nm) on the survival of mackerel and anchovy during the embryonic period (egg stages to onset of feeding) were continued, using the roof-top solarium at the Southwest Fisheries Center and a newly-constructed apparatus in the aquarium. These data indicate survival threshold (LD 50) for anchovy of about 1300 to 1800 m hrs./cm² per day and about 1800 m hrs./cm² per day over a 4 day period. Specimens irradiated with UV/B are being examined histologically and morphologically. Irradiated specimens show a high incidence of lesions in the retina, brain and olfactory epithelium.

Dr. Hunter plans to continue experiments designed to determine the threshold for UV-B radiation damage for mackerel and anchovy in order to improve estimates of threshold dosage levels. It is also planned to continue histological and morphological examination of irradiated specimens and to quantify the incidence of lesions in the eye, brain and olfactory epithelium as a function of dosage.

Experiments Indicate that First-Feeding Anchovy Larvae May Feed Passively on Small Flagellates

Dr. Reuben Lasker, Leader of the Coastal Fisheries Resources Division at the La Jolla Laboratory, reports that in June he completed, with Biological Technician Marcia Pollock, a series of experiments with anchovy (Engraulis mordax) larvae that indicated the possibility that first-feeding larvae may, on occasion, feed passively in very high densities of small flagellates. Although anchovy larvae are visual feeders, small flagellates (ca 10 μ m in diameter) cannot be seen by the larvae and are usually not eaten. However, as can be seen in Table 1, when concentrations of green flagellates exceeded 10^4 per ml. a sizeable proportion of first-feeding larvae fill their intestines, presumably by passive swallowing. Note that in darkness, this type of feeding continues, while in a control feeding situation, where Gymnodinium splendens (ca 40 μ m diameter) was fed, feeding took place in the light but hardly at all in darkness. Thus it is conceivable that in highly eutrophic situations, e.g. in the Peru upwelling area, high survival of larvae may be a result of the coincidence of green water with anchovy spawning and passive feeding by anchovy larvae. Whether these algae contribute to larval growth is not known and requires further study.

PERCENT FIRST-FEEDING ENGRAULIS MORDAX LARVAE WITH FULL OR PARTIALLY FULL INTESTINES

AFTER BEING EXPOSED TO SMALL (ca. 10 μ m) GREEN FLAGELLATES (Dunaliella or Tetraselmis) IN 1-LITER CONTAINERS.

The control was Gymnodinium splendens (50 μ m) at 10^2 /ml.

The number of larvae per container varied from 30 to 82.

LIGHT EXPERIMENT							
Time of feeding (hours)	cells per milliliter						Control <u>Gymnodinium splendens</u> 10 ²
	0	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	
4	0	0	0	0	29	11	30
8	0	0	0	0	40	8	56
16	0	0	0	0	21	13	40
DARK EXPERIMENT							
4	0	0	0	0	31	8	2
8	0	0	0	3	27	23	5

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Division Leader Reuben Lasker and Oceanographer Robert Owen have been asked to join a Canadian/Peru investigation of the Peru Current in November. A pre-cruise meeting was held in Halifax, Nova Scotia this month which Dr. Lasker attended.

Dr. Lasker will work with Ms. Blanca Rojas de Mendiola in Peru at the Instituto del Mar to test the hypothesis that passive feeding by anchovy larvae may be a significant factor for their survival in eutrophic systems. Dr. Owen plans to study small-scale stratification of micro-zoo and phytoplankton.

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Dr. Reuben Lasker, Coastal Fisheries Resources Division, attended a meeting at the University of Rhode Island on post-IDOE planning June 27 to 29.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

First Draft of Anchovy Fishery Management Plan Completed

Dr. Dan Huppert, Program Leader, reported that members of his staff expended considerable effort in completing a first draft of the Anchovy Fishery Management Plan. The draft was reviewed at a meeting of the Anchovy Management Plan Development Team and Anchovy Advisory Panel in Long Beach on June 7, and was presented to the Pacific Fisheries Management Council in Los Angeles on June 14. The first draft covers essentially all of the descriptive and analytical material for a Fishery Management Plan, but was intended as an introduction to the topic and did not contain specific management recommendations. Comments from the Council's Scientific and Statistical Committee will be received at the July meeting of the Council. Following this, the Management Plan Team will work to complete a second draft for possible adoption by the Council in September.

Analysis Indicates Magnitude of 1977 Hake Spawning Biomass at Levels Similar to 1972 and 1975

The sorting of the egg and larva plankton samples collected on the Soviet research vessel Ogon in March 1977 was completed in mid-June. Dr. G. Stauffer began analysis of these survey data and will prepare a final report for the Northwest and Alaska Fisheries Center in July. From the analysis to date, the shipboard scans of the plankton samples for the number of hake eggs were generally a conservative estimate of the hake larvae sorted. The length frequency of hake larvae suggests that the bongo net did not collect large larvae in a higher proportion that experienced with the CalCOFI net nor was extrusion of small larvae an apparent problem as earlier expected. The percent of positive stations with hake

larvae per 10 m² surface area were considerably greater than during the 1976 cruise of the Soviet research vessel Poseydon. On the other hand, the values were approximately the same as those for the March 1972 and March 1973 surveys. This suggests that the magnitude of the 1977 hake spawning biomass was about the same level as in 1972 and 1975.

Research Proposal Under Development to Determine
"Best Mix" Methods for Rapid Assessment of
Anchovy Stocks

Mr. Keith Parker, Statistician, and Dr. Gary Stauffer began work on developing a research proposal for determining the "best mix" of methods for rapid assessment of the anchovy stocks. A meeting was held with SWFC scientists to establish a common understanding and general agreement on the "best mix" problem. Since the meeting, two research projects have been identified that can be carried out in FY77 and FY78. These are to:

- 1) conduct a coordinated aerial and sonar survey in September 1977. The purpose of the survey is to determine if aerial sighting can be effective in stratifying sonar surveys. Survey participants, Fishery Biologists J. Squire and P. Smith, have agreed to coordinate 18 hours of survey time in early September to coincide with Jordan cruise. This will provide six 20-30 mile transects each evening from September 9 to 15.
- 2) analyze anchovy larvae count data from historical CalCOFI data to determine which region-quarters contribute the most to total variance of anchovy biomass estimates so that reasonable stratification sampling strategies might be considered for 1978 CalCOFI cruises. In effect, this would probably add sampling stations in some regions in 1978.

Aerial and Anchovy Vessel Logbook
Coding in Progress

Doug Chessmore at the La Jolla Laboratory has completed the coding of the logs for 6-1/2 anchovy vessels. These vessels are a sample of the active boats in the fleet. These logs will be used in evaluating catch per unit of effort for the anchovy fishery.

Bob Scheldrup and Mike Klicpera are proceeding with the coding of the logs from the aerial fish spotters working with the commercial wetfish boats in southern California.

They have completed the coding for 1976, 1975, 1974, 1968, half of 1973, and 1967. Data editing has been temporarily delayed with the expiration of the appointment of mathematician J. Caruso.

* * * * *

Fishery Biologist John MacGregor is attempting to establish criteria for aging rockfish for growth studies. This month he reports that a sample of blue rockfish (Sebastes mystinus) from Tanner Bank has been aged. The growth curve is about the same as found for blue rockfish from Monterey, California. Two specimens from Osborn Bank appear to have a slower growth rate.

Work has been started on aging a large sample of rosy rockfish (Sebastes rosaceus). This is one of the more abundant species although generally too small to be of great importance to fishermen.

Oceanic Fisheries Resources Division

PORPOISE/TUNA INTERACTION PROGRAM

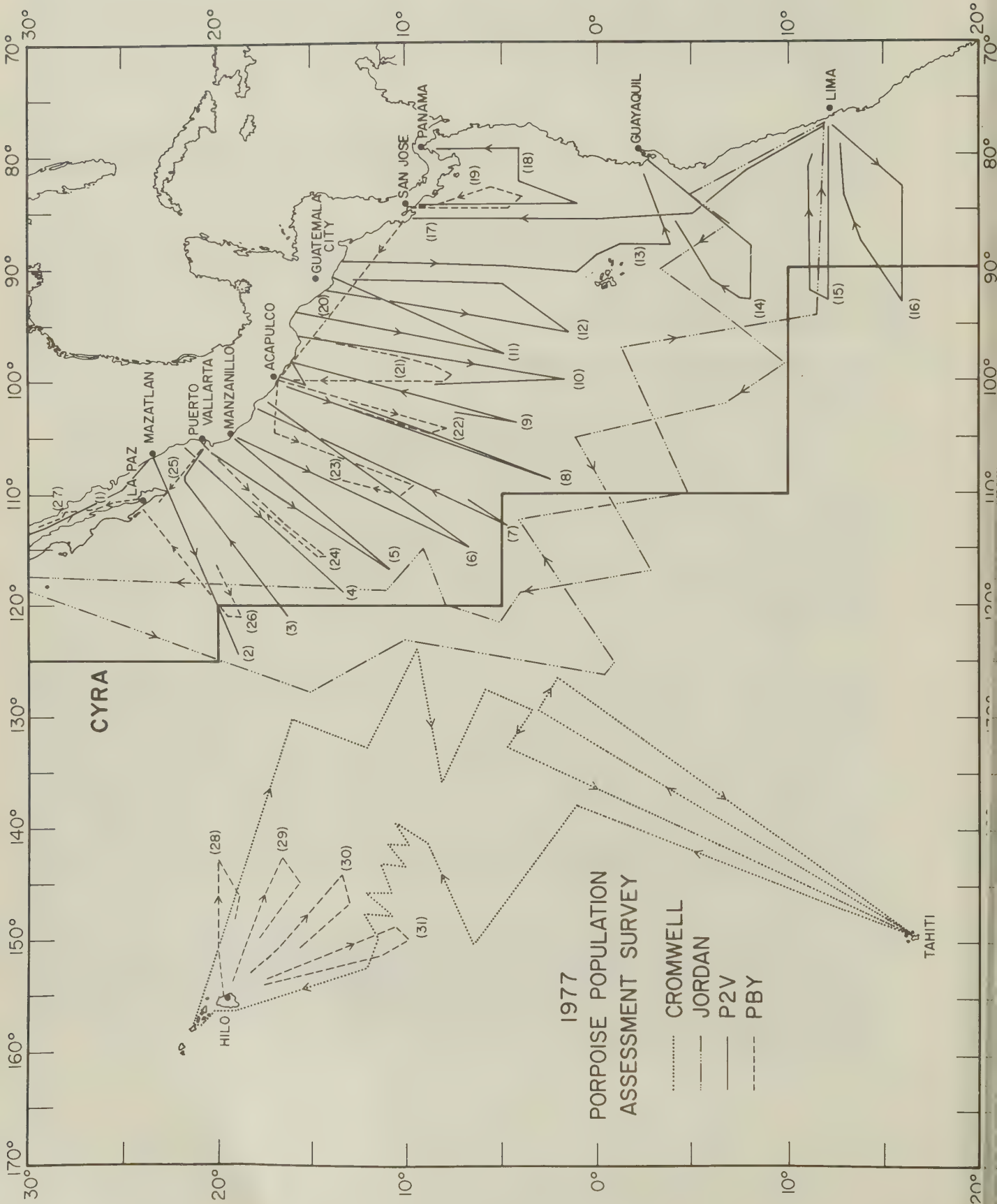
1977 Porpoise Stock Assessment Aerial Survey Completed

The 1977 porpoise stock assessment aerial survey was completed on June 20 following four flights out of Hilo, Hawaii. These flights, extending east and southeast from Hilo, were designed to cover the western trip of the postulated boundary of porpoise populations involved in the yellowfin tuna fishery. The eastern edge of the boundary, which extends along the coast of central and south America from about 25°N to 10°S, was covered by a series of tracklines about 100 nautical miles apart at the shore and 250 miles apart at their seaward extension of approximately 950 miles.

The eastern edge of the survey began in January aboard a World War II vintage naval patrol aircraft, a P2V Neptune. Using this airplane, 16 observational flights were carried out beginning in Mazatlan, Mexico, gradually working south to Lima, Peru. On the 17th flight an engine failure caused an emergency landing in Panama which permanently grounded the plane.

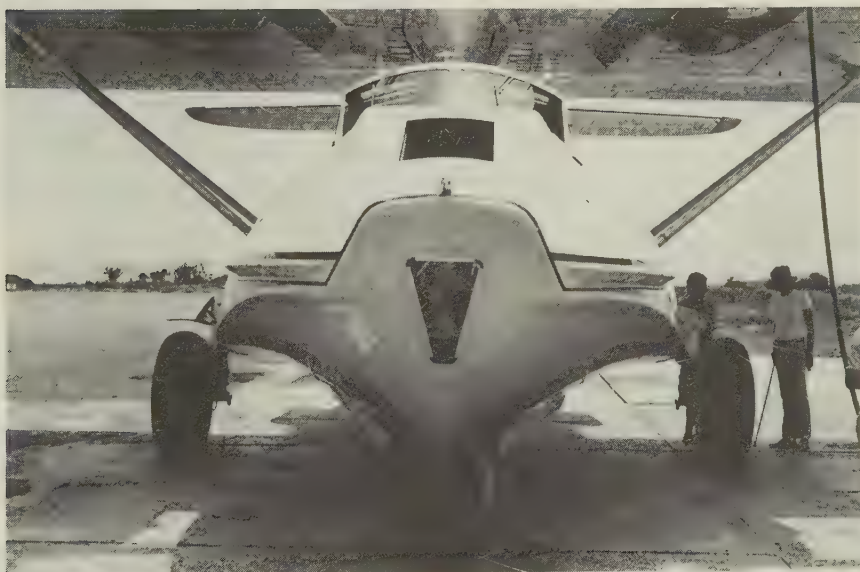
With the P2V inoperative, a PBY Catalina, belonging to the Cousteau Society, was chartered to complete the survey. Starting in Costa Rica and working north, the airplane repeated alternate flights previously flown by the P2V to update the survey information and complete the eastern edge of the survey area.

The PBY was then equipped with extra gear for the long trip to Hawaii for the final flights of the survey. Completion of these flights on June 19 brought to an end the extensive porpoise stock assessment survey of the eastern tropical Pacific Ocean and its boundaries. The data are now being reviewed and analyzed to be embodied in a report prepared by Dr. Eric Barham, Leader of the survey.





Pictured above is the PBY aircraft, used on the porpoise population survey. Note the logo of the Cousteau Society, owner of the plane.



Front view of the PBY owned by the Cousteau Society with whom NMFS has contracted to complete the survey of porpoise populations in the eastern tropical Pacific. Shown inside the bow observation position is Richard Charter, NMFS observer. Standing at right are Phillipe Cousteau, chief pilot and William Walker, NMFS observer. The picture and others shown was taken (by Chuck Oliver of the La Jolla Laboratory who participated in the survey) while the plane was being refueled in Acapulco, Mexico.

Preliminary Tests Conducted of Satellite-Linked Tracking System to Locate Porpoise

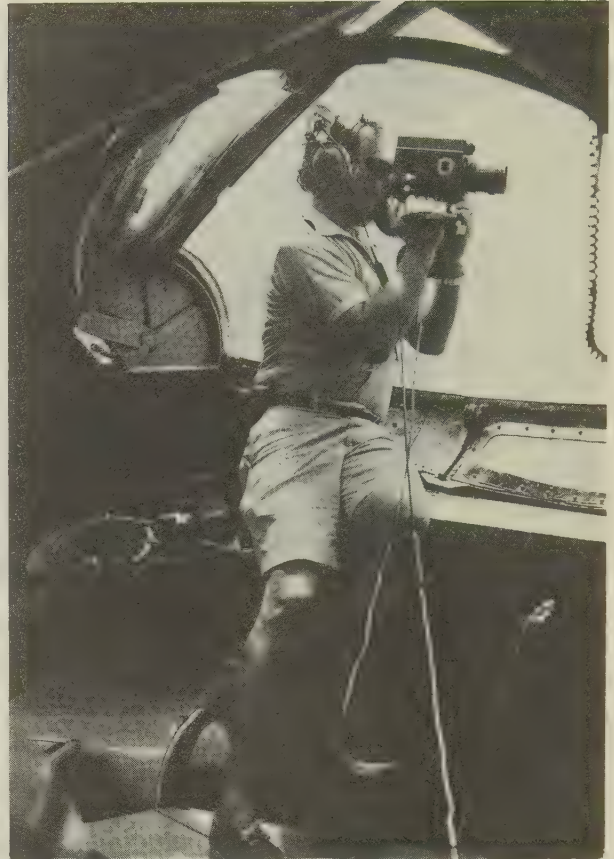
Preliminary tests of a satellite-linked transmitter and antenna system were conducted at Sea World of San Diego June 27 to July 7 by the staff of the La Jolla Laboratory's porpoise tagging program and members of the NMFS National Fisheries Engineering Laboratory (NFEL) of Bay St. Louis, Mississippi. The system is being developed by NFEL for the Southwest Fisheries Center; the objective is to track, by satellite, porpoises equipped with radio transmitters in order to follow the movements of porpoise in the sea.

Of 9 well-positioned satellite orbits, the transmitter made sufficient contact to fix the location of the porpoise at Sea World four times. According to Mr. John Everett, leader of the Porpoise/Tuna Interaction program at the La Jolla Laboratory, first results are encouraging even though the transmitter may have malfunctioned.

Chartered Tuna Seiner with Porpoise-Saving Gear Aboard Reports No Roll-Ups

The chartered tuna purse seiner Margaret L on which NMFS has installed the new anti-roll-up system, a refined super apron, and the Guillen snap links (a quick release ring through which the pursing cable runs), reports no roll-ups and a rate of porpoise mortality greatly reduced in comparison to last year. Two NMFS technicians are aboard the seiner to observe and record operation of the new gear.

Each Wednesday afternoon, the staff of the Mortality Reduction program at the La Jolla Laboratory employs the facilities of Commerce-licensed radio station WWD at the Scripps Institution of Oceanography to transmit information via radio facsimile (FAX) on the latest porpoise kill rates to the tuna fleet operating in the eastern tropical Pacific. These kill rates are compared to the 1976 averages and one of the many proven techniques to aid in



Dr. Eric Barham, survey leader for the porpoise populations survey is shown using a gyro-stabilized motion picture camera from the PBY's port blister.

reducing the mortality of porpoise is described as a service to the U.S. tropical tuna fleet by the NMFS Southwest Fisheries Center and the Porpoise Rescue Foundation, a group sponsored and financed by the U.S. tuna industry.

Porpoise Regulations Economic Impact
Statement Updated

Susan Capalbo from the NMFS Office of Fisheries Development, Washington D.C., arrived at the La Jolla Laboratory on June 28 to work with Messrs. Dan Huppert and Dennis King on updating the Economic Impact Statement for the 1977 Porpoise/Tuna regulations. Economic Impact Statements must accompany all major proposals for legislation and for the promulgation of regulations or rules by any executive branch agency, as spelled out in Executive Order 11821 and Dept. of Commerce Administrative Order 218-6. Upon receiving assistance in gathering information and in writing a new portion of the Statement, Ms. Capalbo returned to Washington, D.C.

A new Economic Impact Statement will be required for the 1978 Porpoise/Tuna regulations and any regulations promulgated under the authority of the Fishery Conservation and Management Act must also be accompanied by such statements.

TUNA RESOURCES PROGRAM

Tuna Vessels Participating in FAX Program
Increase Reporting Rates in June

During June, 29 U.S. tuna seiners participated in the FAX program of the La Jolla Laboratory. Reporting rates this month were up from June 1976 by 98% as shown below:

	Weather Observations	XBT Observations	Total	Year-to-Date
1976	182	11	193	1961
1977	361	28	389	1059
Percent change	+98.4%	+154.6%	+101.6%	-46.0%

The increase in the reporting rates for June of 1977 appears to be due to the fact that almost all of the vessels were at sea in June of this year following the protest by the tuna fleet of quotas set on the taking of porpoise.

In June of 1971, some of the vessels were in port following the close of yellowfin fishing inside the CYRA.

Congratulations are again due Messrs. Noah and John Gomes of the fishing vessel, Santa Rosa, who led cooperating vessels by radioing 35 weather and 3 XBT observations to the Southwest Fisheries Center in June.

Puerto Rico Sampling Program of Foreign Imports of Atlantic Tuna Continues

Tunas caught in the Atlantic and transshipped to Puerto Rico have been regularly sampled for biological information by Eugene Holzapfel of the La Jolla Laboratory since March 1975. Fifty fish samples are routinely collected in Mayaguez and Ponce to obtain data on fork length, weight and species composition. The data are processed by Statistical Assistant Gene Tillerson at the La Jolla Laboratory. Samples taken to date in 1977 are as follows:

Species	Gear	Number of samples taken	Number of fish sampled	Est. tonnage sampled (in metric tons)
Yellowfin	Baitboat	9	423	57.32
Skipjack	Baitboat	10	394	1153.95
Bigeye	Baitboat	6	283	33.86
Albacore	Longline	4	200	655.22

Average fork lengths are 69 cm for yellowfin tuna, 44 cm for skipjack tuna, 49 cm for bigeye tuna, and 101 cm for albacore tuna. All samples were from catches transshipped in the first quarter of 1977.

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Dr. Norman Bartoo, Fishery Biologist at the La Jolla Laboratory, participated in a Swordfish Workshop at the Southeast Fisheries Center in Miami, Florida June 6 to 10. The workshop, chaired by Dr. Grant Beardsley, had three primary objectives: 1) sharing data and information; 2) identification of necessary research and 3) recommendations for action to regional management councils. Five major presentations highlighted the discussions; the Pacific fishery (California) by Mr. C. Hooker of the California Department of Fish and Game, the Atlantic fishery by Mr. M. Bartlett, biology and ecology of swordfish by Dr. D. deSylva, populations dynamics by Dr. J. Caddy and a discussion of the Food and Drug Administration's expected stand on mercury levels in fish by Mr. J. Emmerson. A summary of the proceedings is being prepared by the chairman.

Synopses of Fishery Advisory Services to be Published by FAO

Mr. Richard Evans, Oceanographer at the La Jolla Laboratory, has completed a manuscript for FAO describing the fishery/environment products currently being prepared at the La Jolla Laboratory to assist fishermen.

The products include the publication, Fishing Information, and charts of environmental conditions on the fishing grounds which are prepared as part of the "Cooperative Tropical Tuna Advisory (FAX) program." The FAX (an acronym for "radio facsimile") program broadcasts the charts routinely from WWD, a U.S. Department of Commerce-licensed radio station located at the Scripps Institution of Oceanography in La Jolla. A schedule of broadcasts and types of charts are shown in the following table.

The synopsis prepared by Mr. Evans, as well as descriptions of similar services from throughout the world, will be edited and published by FAO as a world directory of fisheries advisory services.

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The May issue of Fishing Information went to press on June 23, according to Fishery Biologist James Renner, editor of the publication.

Two supplements with the Albacore Bulletin attached were also produced and mailed during the month.

The number of recipients on the mailing list for Fishing Information reached 750 on June 1. All new requests will be placed on a waiting list, since the publication is only authorized for free distribution of 750 copies per issue.

PACIFIC ENVIRONMENTAL GROUP

OCEAN MODELING AND FORECASTING

Academic Training at Oregon State University

Mr. Andrew Bakun returned this month to Monterey from an academic year of training at Oregon State University. Oregon State provides an interesting mix of basic and applied ocean research activities, with emphasis on eastern boundary current processes. Strong interest in marine fisheries is represented both within the School of Oceanography and in the Department of Fisheries and Wildlife. For example, a specialized course in fishery-oceanography, stressing interdisciplinary aspects, excited much interest and participation.

Mr. Bakun found that the concern for an interdisciplinary approach, combined with the effective ongoing research at O.S.U. in the various basic disciplines of ocean science, made for a stimulating experience, very pertinent to the needs of an NMFS scientist.

Type of Product	Mode of Dissemination*	Broadcast Frequency	Frequency of Issue	Time of Issue (GMT)	Product Valid Time (GMT)	Areal Coverage	Product Originator	Prime User	Product Content
1. Wind & weather analysis and forecast	Radio facsimile	8644.1 & 17,408.6 kHz	Daily	1500 2300	0600 1800	From the west coast of N&S America to 160°W between 20°S and 37°N	National Weather Service	Tropical Tuna Fleet	Wind speed, wind direction, position of the Inter-Tropical Convergence Zone (ITCZ), cloud cover, positions of severe weather, initial and forecast positions of tropical disturbances
2. Sea & swell analysis & forecast	Same	Same	Same	2310	1800	Same	Same	Same	Wave height, swell height, swell direction, swell period, and areas of rough seas.
3. Weekly mean sea surface temperature analysis (tropical area)	Same	Same	Weekly on Thursday	2320	Previous 7-day period	From the west coast of N&S America to 140°W between 6°S and 30°N	Southwest Fisheries Center	Same	Weekly mean sea surface temperature (SST) isotherms derived from weekly 1° square averages of SST. Contour interval 1°C with areas of sparse data coverage indicated by dashed contours.
4. Weekly mean mixed layer depth analysis (tropical area)	Same	Same	Weekly on Friday	2320	Same	Same	Same	Same	Weekly mean mixed layer depth (MLD) derived from energy numerical models, computed for 5° squares. The results are hand contoured at 50 foot depth intervals. Areas of sparse data are indicated by dashed contours.
5. Tropical storm advisories	Verbal broadcasts	Same	As required	1510 2310	As indicated in broadcast	Same	Same	Same	Information concerning tropical storms or other areas of inclement weather. The broadcasts contain present and forecast positions of storms, areal extent, expected winds, direction and speed of the storm, pertinent sea state information, and other information as required.
6. Weekly mean sea surface temperature analysis	Radio facsimile	Same	Weekly on Friday during albacore season (July-Oct.)	1700	Same	From the west coast of N. America to 141°W between 28° and 52°N	Same	Albacore fishermen	Weekly mean sea surface temperature (SST) isotherms derived from weekly 1° square averages of SST and hand contoured. Contoured interval 1°C.

*All broadcasts from radio station WWD are upper sideband carrier frequencies. The facsimile scan rate is 120 lines/minute with an international index of cooperation of 576.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Juvenile Rockfishes Appearing Inshore at Northern California Study Site

During this month large schools of juvenile rockfishes, Sebastes, of at least two species have appeared inshore along the Mendocino Coast. Identifications are pending. Observations and collections made by Dr. Edmund Hobson, Leader of the Inshore Fish Communities Task, and Fishery Biologist Tony Chess at the Tiburon Laboratory, show these juveniles are concentrated close to the sea floor, with one species over open sand, the other among the rocks. The latter are major prey at this time of other rockfishes, including Sebastes melanops and S. miniatus. Two other rockfishes in the area, S. nebulosus and S. mystinus, do not seem to prey on these juveniles.

Groundfish Analysis Begun as Part of Groundfish Management Plan

Dr. William Lenarz, Leader of the Rockfish Analysis Task at the Tiburon Laboratory, began a cohort analysis of the Dover sole, petrale sole, and English sole, as part of his duties as a member of the Groundfish Management Plan Development Team. A particularly good set of data is available for Dover sole from the north coast of Oregon. Age composition data for 1951 to 1976, and age-specific discard rates, are also available.

Spatial Distributions of Rockfishes in Queen Charlotte Sound Defined

Mr. Peter Adams, Fishery Biologist with the Rockfish Analysis Task at the Tiburon Laboratory, completed an analysis of spatial distributions of rockfishes and other groundfish in the Queen Charlotte Sound using a weighted negative binominal model. When mean estimates of the number of fish were corrected to a standard volume of water, the rockfishes, Sebastes spp., generally were strongly aggregated, with a positive relation between mean number of fish and degree of aggregation over the three depths sampled ($p > .01$). Conversely, other groundfishes were far less aggregated, with only a weak positive relation between mean number of fish and degree of aggregation over the three depths sampled ($p < .05$).

Sampling of Rockfish from Sportfishing Fleet Intensified

Collections of rockfish specimens from the sportfishing fleet were intensified this month, according to Dr. Lenarz, Task Leader. Nine to 12 boats were sampled, compared to the 3 to 4 boats sampled during previous months. In addition, review of the data showed that it was more efficient

to sample four angler bags per trip, rather than the six previously sampled. Because the species vary between fishing areas, and generally four to six species are taken on any one trip, it was judged that by sampling more boats the species present will be better defined. The more intensive sampling, which is to continue through July, will provide data permitting firmer guidelines for future work.

Filet Recovery Study Continues

Mr. Ed Ueber, Economist with the Rockfish Analysis Task, aided by Mss. Echeverria, Fourre and Ryan, continued study of fillet recovery rates of groundfish with work at the Ocean Beauty Plant in Sacramento.

Task Leader Attends International Groundfish Committee Meeting

Dr. Lenarz attended a meeting of the Technical Subcommittee of the International Groundfish Committee in Seattle, June 15 to 17. At this meeting the groundfish fisheries were reviewed for each Pacific State and the Province of British Columbia. Dr. Lenarz was asked to join a committee to assess shelf rockfish fisheries.

FISHERIES DEVELOPMENT INVESTIGATION

Mr. Susumu Kato, Investigation Leader at the Tiburon Laboratory, traveled to southern California on May 26 to June 10 to meet with fishermen, processors, fish brokers, and researchers at various coastal towns. The following summarizes highlights of discussions and observations:

1. A fishery for blue sharks is starting to develop at San Pedro. Sus Kato will help outfit a vessel and teach the captain efficient longline methods.
2. Japanese brokers are actively searching for fish to export to Japan. The traditional items are the most desired (e.g., salmon, herring roe, salmon roe), but other species are also beginning to show greater market acceptance. Sablefish, jack mackerel, saury, flatfish, squid, and rockfish are all possible export items. Problems with size, quality, price, quantity, processing capability, and import restrictions will have to be resolved. Arrangements were made for potential suppliers to prepare samples of various species for evaluation.
3. Trawl fishermen from Monterey to Santa Barbara are interested in participating in the laboratory's planned effort to use midwater trawls to catch fish. Possible target species are rockfish, shrimp, squid, and euphausiids, and one boat owner would even like to try anchovy fishing. Plans call for placing an experimental midwater trawl aboard various vessels along the coast.

4. According to researchers, there is little known about seasonal availability of euphausiids in inshore waters. Even less is known about the quantities which could be expected to be taken in commercial operations. Attempts were made to interest Sea Grant personnel and a Scripps Institution of Oceanography graduate student into looking into these areas as possible research projects. About 700 pounds of Euphausia pacifica taken by the vessel Lady Olga were delivered to San Francisco Bay Brands in Newark (near San Francisco). The euphausiids will be processed into several types of aquarium fish food. If the euphausiid is found suitable and the economics favorable, the firm can reportedly use a half-million pounds of euphausiids per year.

5. The sea urchin fishery is thriving, but the seasonal problem of low prices in Japan, coupled with low gonadal yields (due primarily to spawning but also caused in part by larger percentages of off-colored roe), continue to plague processors. Several processors have suspended operations until August, and others are searching for secondary products to keep their plants operational during summer. Sea cucumber was frequently mentioned as a possible substitute. Since maintaining their labor force is the chief concern of the processors, ocean shrimp processing was suggested as an alternate for the summer, and arrangements made to have samples sent to a couple of firms.

Recreational Fisheries Improvement Task

The feeding experiment comparing fresh with year-old dry pellet salmon feed, was ended this month according to Roger Green, Task Leader at Tiburon. No effect of the feeds on growth or mortality was discernable. However, the experimental fish in the miniature pens grew from 37 grams, average, to only 47 grams during the five-week experiment, while those in the main pen grew from 37 grams to 71 grams in the same period. A new experiment was started comparing dry pellet feed to frozen euphausiid-supplemented rations. Blood samples were taken by members of the University of California, Berkeley, Physiology Department for measurements of vitamin C and a growth hormone.

Modifications were made on one of the main pens, making it more rigid to eliminate wearing of the net and connecting hardware. Following problems with night herons, the bird predator net has also been modified and repaired.

Arrangements were made for delivery of the next rearing batch of coho salmon on July 7, 1977.

PHYSIOLOGY INVESTIGATION

OCSEAP Petroleum Task

Tests to determine the toxicity of the water-soluble fraction of Cook Inlet crude oil to the bay shrimp (Crago) were conducted. Concentrations of monocyclic aromatic components up to 1.5 ppm were not lethal to shrimp in continuous exposures of 96 hours. Additional concentrations were tested but have not been analyzed to date.

Studies were begun to determine growth rates of juvenile littleneck clams (Protothaca staminea) fed the alga, Dunaliella. Clams filter fed on the alga but no measurable growth or weight loss occurred during the two-week feeding period. This experiment will continue.

Growth rates of Dunaliella were determined in closed system cultures. After earlier experimentation it was decided to expose the phytoplankton to water-soluble hydrocarbons in closed containers in a shaker bath because 1) open-flow systems are not adaptable to use with phytoplankton, and 2) aerating any system drives off volatile components.

Techniques are being developed to continuously dose phytoplankton with the water-soluble fraction of crude oil in a closed system. Water-soluble components were volatilized and bubbled through the phytoplankton culture producing high concentrations of monocyclic aromatic components in the culture media.

Long-term exposures of phytoplankton and clams to the water-soluble fraction (WSF) of Cook Inlet crude oil were started this month. Using the solubilizing apparatus developed at the Tiburon Laboratory, doses of approximately 100 ppm of aromatic petroleum hydrocarbons were flowed continuously through tanks containing the alga, Dunaliella, and the littleneck clam, Protothaca.

Exposed phytoplankton will be fed to clams that have been exposed to WSF via the water column, and these clams will be fed to starry flounder. Subsamples of clams and flounder tissues will be analyzed to determine the rate of uptake of each component of the WSF. Studies on the effects of WSF on spawning clams and studies of growth rates of clams fed Dunaliella were also begun this month.

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Dr. Jeannette Whipple, Task Leader, and Tom Yocom traveled to the Northwest and Alaska Fisheries Center (NWAFC) this month to discuss proposed fiscal year 1978 OCSEAP research with representatives of OCSEAP tasks from Seattle (NWAFC) and the Auke Bay Fisheries Laboratory. The meeting was designed to assure comparability of results and to minimize duplication of effort.

Tom Yocom and Jeannette Whipple coauthored a research proposal to renew OCSEAP contract funds for FY 1978 and to outline potential studies for FY 1979. In addition, they prepared a quarterly report to the OCS office in Juneau.

Experiment on Effects of Different Food Rations on Feeding Striped Bass Larvae Concluded

An experiment testing the effects of six different food rations on newly feeding striped bass larvae was concluded in June. Striped bass began feeding seven days after fertilization and were given daily rations of 0, 0.01, 0.1, 0.5, 1.0 and 5.0 *Artemia* sp./ml. The density of 0.1 microcrustaceans/ml is the estimated field density of food zooplankters in the striped bass nursey areas. Larvae survived and grew in direct relation to the amount of food available. After 34 days, daily survival at the different densities was highly divergent, with starved larvae at 12% and the high density larvae at 72%. Likewise growth and development were positively correlated with food density. Starved larvae did not grow at all throughout the experimental period while fed larvae grew at graded rates, reaching approximately 14.0 mm SL on Day 34. Cannibalism began on Day 15 and continued in the middle food densities of 0.1 and 0.5 *Artemia*/ml. No cannibalism was seen at any time in either the starved or the high sensitivities. As was found in last year's experiments larval yolk was consumed by Day 7 when feeding began. In contrast, the oil globule, which comprised 63.7% of the unfertilized egg dry weight, remained in the larvae well into feeding, and its utilization rate was inversely related to food density. Starved larvae had a considerable amount of oil left at Day 34 while the fed larvae had consumed their oil by Day 25.

MISCELLANEOUS

Anita Coit Honored as Woman of the Year by San Diego Chapter of FEW

Ms. J. Anita Coit, Administrative Assistant at the Southwest Fisheries Center, was named Woman of the Year by the San Diego Chapter of Federally Employed Women (FEW) at a dinner meeting of the organization at the Admiral Kidd Club on June 23.

Ms. Coit, a federal employee since 1958, was honored for her outstanding contributions to the organization which included service as president of the local chapter in 1975-76. A charter member of the San Diego chapter which was formed in 1972, Ms. Coit has been active in the Affirmative Action, Employment Opportunities and Minorities Emphasis Task



Forces of the FEW. She helped start and continues to be a regular contributor to the FEW Newsletter which provides information on training and job opportunities, plus coverage of local and national legislation and other news affecting federally employed women.

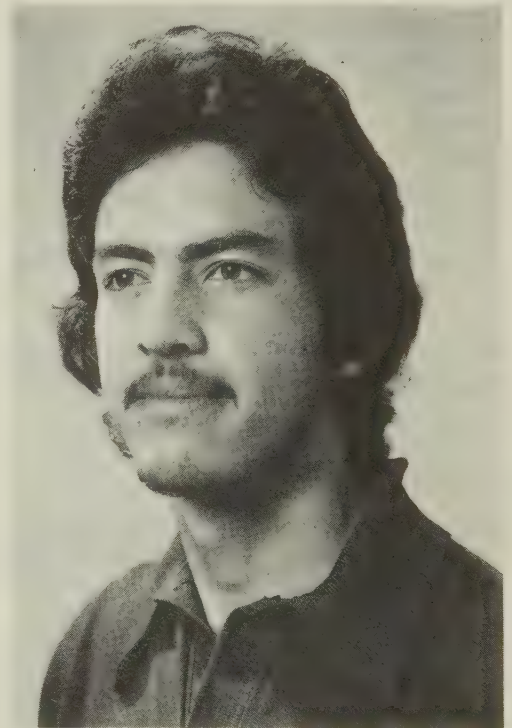
Ms. Coit began her government career as a biological aid with the U.S. Fish and Wildlife Service in San Diego, gradually advancing in responsibility to her present duties as assistant to the Executive Officer of the Southwest Fisheries Center.

According to Ms. Coit, Federally Employed Women, Inc. was founded in 1968 by a group of women in Washington, D.C. interested in improving opportunities for women in government, and presently has 90 chapters throughout the U.S.

Lincoln High Honor Graduate Wins NOAA
Junior Fellowship for Study at
Fisheries Laboratory

Salvador Castro, Jr., recipient of an Outstanding Student Award at Lincoln High School in San Diego, was selected this month as a National Oceanic and Atmospheric Administration Junior Fellow at the Southwest Fisheries Center in La Jolla.

In June of this year, Castro graduated eighth in his class of 243 seniors. In addition to his scholastic honors, Castro has also distinguished himself as a pitcher on the Lincoln High varsity baseball team for 3 years. The son of Mr. and Mrs. Salvador Castro, Sr., he was born in National City and has lived in San Diego all his life. He is the eldest of six children.



As a NOAA Junior Fellow, Castro will work full-time during summer vacations and part-time during the school year at the La Jolla Laboratory while he attends San Diego State University as an engineering major. His first work assignment will be as an assistant to Fred Kellenberger, Data Systems Manager at the La Jolla Laboratory. Castro, who is interested in mathematics, will help prepare fisheries data for computer processing, keypunch information on cards, analyze computer input and output forms, prepare flow charts and documentations and run batch and on-line computer jobs. Eventually, he will assist senior programmers in the development and writing of computer programs.

NOAA's Junior Fellowship program is a nation-wide effort to interest talented young people in future careers with NOAA. Each year during the months of March and April, local high school teachers and counselors are asked to nominate senior students who are in the top 10% of their graduating class. Other criteria for nomination include a financial need by the student to complete his or her college education, acceptance by a 4-year college (or who have applied for admission) and an indication by the student of a desire to pursue a course of study for which NOAA has a long-range need (meteorology, oceanography, physics, geodesy, cartography, mathematics, engineering, etc.). In the San Diego area, the final selection is made by the Director of the Southwest Fisheries Center with the advice of a committee of Center employees.

HONORS AND AWARDS

- June 7 - Richard McNeely, Electronic Research Engineer, Outstanding Performance Rating; Dr. Gary Sakagawa, Fishery Biologist, Outstanding Performance Rating; Benjamin F. Remington, Executive Officer, Outstanding Performance Rating, all of the La Jolla Laboratory.
- June 24 - Dr. Jerry Wetherall and Mr. Ray Sumida were honored as the Honolulu Laboratory's nominees for the Supervisory Employee and Employee of the Year award categories, respectively at the Federal Executive Board's awards luncheon on June 24. Dr. Richard Barkley attended, substituting for Director Richard Shomura.
- June 30 - The appointment of Center Director Izadore Barrett as a member of the La Jolla Underwater Park Advisory Committee was confirmed by the San Diego Council. Mr. Barrett's term of service on the Committee will extend to March 1, 1979.

PUBLIC AFFAIRS

La Jolla Laboratory

- June - Mr. W. Miller, instructor at Carlsbad High School, brought a group of 60 students to the Center to view films and inspect the Center's laboratories and other research facilities. Ms. Vlymen was the tour host for the group.

Tiburon Laboratory

- June 15 - Mr. Edmundo Mena, Under Secretary of Fisheries, Ecuador, accompanied by Guido Conill, Escort/Interpreter, U.S. Department of State, visited the Tiburon Laboratory. They were taken on a tour of the operations of the laboratory and given a description of the northern California fishery.

PRESS RELEASE

- June 7 - Issued by the La Jolla Laboratory to West Coast News sources: "Lincoln High Honor Graduate Wins NOAA Junior Fellowship for Study at Fisheries Laboratory."

TRAINING

- June 1-3 - Nancy Wiley, Tiburon Laboratory; Advanced Programming Techniques, Institute for Advanced Technology, Palo Alto, California.
- 20-24 - Robert D. Haught, LT JG, NOAA Corps, Tiburon Laboratory; Introduction to Computer Programming, San Francisco, California.
- 21-24 - Ms. Marian Yong, Honolulu Laboratory, completed a Civil Service Commission course on technical writing.

MEETINGS AND TRAVEL

- May 15 -
June 2 - Drs. Michael Laurs and Gary Sakagawa from the La Jolla Laboratory and Dr. Jerry Wetherall of the Honolulu Laboratory, attended the North Pacific Albacore meetings at the Far Seas Research Laboratory in Shimizu, Japan. According to the participants the meetings were productive and plans were made for the upcoming billfish stock assessment workshop. The business meetings were followed by visits to a tuna cannery, fish processing plants, tuna landing centers and aquaculture facilities, as well as informative visits to the Tohoku Laboratory and various prefectural fishery research stations.
- June 2 -
July 6 - LTjg Dale Bretschneider, PEG, traveled to La Jolla to participate in a fishery oceanography cruise aboard the R/V David Starr Jordan.
- June 2 - Messrs. Shomura, Otsu and Hida of the Honolulu Laboratory attended a meeting called by Dr. Stanley Swerdloff of the Pacific Tuna Development Foundation (PTDF) to discuss distribution of anchovy brought in to Honolulu aboard the Pacific Trojan. The Hawaiian skipjack tuna vessels, Lehua and Anela were selected by drawing to receive the bait; however, it was decided later between the captains

of both vessels that the Lehua would take all the bait. In general it was observed that the anchovy had a tendency to dive when chummed and this behavior kept the skipjack tuna away from the stern of the vessel.

- June 6-7 - Mr. Shomura and Dr. Mendelssohn of the Honolulu Laboratory were in Houston, Texas to attend the Optimum Yield Workshop.
- 6-9 - Ms. Margaret Domras, Administrative Assistant, PEG, traveled to Los Angeles, California to attend a Management Orientation Course.
- 6-25 - Dr. Douglas McLain, PEG, traveled to Narragansett, Rhode Island and Washington, D.C. to attend various meetings and confer with staff at Atlantic Environmental Group, National Ocean Survey, Center for Experimental Design and Data Analysis, and NMFS Central Office.
- 7 - Dr. Jeannette Whipple and Mickey Eldridge, Tiburon Laboratory, attended an interagency committee meeting in Sacramento. The purpose of the meeting was to discuss conditions of the Sacramento-San Joaquin Delta and the apparent impact of the drought on the environment.
- 9 - Dr. Jeannette Whipple and Tom Yocom, Tiburon Laboratory, traveled to the Northwest and Alaska Fisheries Center in Seattle to discuss proposed fiscal year 1978 OCSEAP research with representatives of OCSEAP tasks from Seattle and the Auke Bay Fisheries Laboratory.
- 9-10 - Center Director Barrett attended an Optimum Yield Workshop in Houston, Texas.
- 12-15 - Mr. David Husby, PEG, traveled to San Francisco, California, to attend an AAAS meeting.
- 12-16 - Dr. Paul Smith of the Coastal Division presented a paper in San Francisco entitled, "Coastal pelagic fish stocks off the west coast of North America and some environmental conditions associated with their distributions," at the Pacific Division meeting of the American Society of Limnology and Oceanography.
- 12-18 - Senior Scientist Elbert Ahlstrom in Washington, D.C. to confer with ichthyologists and study fish specimens in the Smithsonian fish collection.

- June 12-18 - Dr. Michael Laurs traveled to Honolulu to prepare a research plan for joint albacore studies with Dr. Jerry Wetherall.
- 13-14 - Mr. Barrett in Los Angeles to attend a meeting of the Pacific Fishery Council Scientific and Statistical Committee.
- Drs. G. Stauffer and D. Huppert in Los Angeles to attend the meeting of the Pacific Fishery Management Council and to present the draft of the Anchovy Management Plan.
- 15 - Mr. Shomura, Mr. Uchida and Dr. Mendelsohn of the Honolulu Laboratory attended the Hawaiian Skipjack Fleet Workshop at the Marks Estate called by Mr. Andrew Gerakas, Chairman/President, PTDF. The PTDF's Pacific Islands Fisheries Development Committee, in cooperation with NMFS, University of Hawaii, the fishing industry and other State agencies, will take the lead role in the preparation of a comprehensive plan for development of the Hawaiian skipjack tuna fleet; the plan will serve as the basis for funding future action programs. The workshop concentrated on an analysis of problems within the present fishery and on procedures necessary to prepare a developmental program.
- 15-17 - Center Director Barrett, accompanied by Dr. W. Fox, in Washington, D.C. to attend a delegation meeting in preparation for the Inter-American Tropical Tuna Commission Tuna/Porpoise meeting slated in San Diego later this month.
- Dr. Bill Lenarz, Tiburon Laboratory, attended a meeting of the Technical Subcommittee of the International Groundfish Committee in Seattle. At this meeting the groundfish fisheries were reviewed for each Pacific State and the Province of British Columbia.
- 20-21 - Dr. Richard Parrish, PEG, traveled to Los Angeles, California to give a seminar at California Fish and Game Conference.
- 20-24 - Dr. Edmund Hobson, Tiburon Laboratory, attended the annual meeting of the Society of Ichthyologists and Herpetologists at Gainesville, Florida where he presented a paper entitled, "Trophic Relations among Fishes and Plankton."
- 21-22 - Chaired by Director Barrett, the Center Management meeting was held in SIO Building T-29. Attending were representatives of top management from the Center's four laboratories.
- 27 - Representatives from California Department of Fish and Game met with the Rockfish Analysis Task group at Tiburon in connection with samplings of rockfish landings.

June 28-29 - Mr. Shomura attended the 5th meeting of the Western Pacific Regional Fishery Management Council in Honolulu.

VISITORS

Honolulu Laboratory

- June 1 - Mr. Kentaro Iwasa, Japan Marine Fishery Resource Research Center (JAMARC), Tokyo. Mr. Iwasa was in Honolulu to board the No. 1 Kaki Maru, a vessel chartered by JAMARC to fish experimental longlines in southern latitudes, primarily to explore for bigeye tuna.
- 15 - Dr. Frank J. Hester, independent fisheries consultant, Santa Barbara, California.
- 16 - Students and faculty members of the Miyazaki Prefectural Fisheries High School, Japan, who arrived in Honolulu on the school's research vessel, Shinyo Maru. Mr. Otsu conducted a tour of our research facilities at Kewalo Basin for the group.
- 30 - Prudence Fox, NMFS, Washington, D.C.

La Jolla Laboratory

- June 6 - Dr. Matthew J. Sobel, Yale University, New Haven, Connecticut.
- Mr. George S. Fishon, University of North Carolina, Chapel Hill, North Carolina.
- Ms. Cathy Short, NMFS, Montlake Center, Seattle, Washington.
- Dr. Gary Smith, Chief, Fisheries Management Division, Southwest Region visited the Center for discussions with Dr. William Fox.
- 9 - Mr. Edmundo Mena, Under Secretary of Fisheries for Ecuador, visiting this country as a guest of the U.S. State Department to inspect fisheries centers. Mr. Mena was accompanied by Mr. Guido Conill of the State Department as his guide and interpreter.
- 13 - Mr. William P. Jensen, NMFS, Marine Mammals, Washington, D.C.
- 14 - Mr. Barry E. Bollin and Ms. Cindy Beck, Orange Coast College Marine Science Department, Costa Mesa, California.
- 16 - Mr. A. A. Spark, Fishing Industry Research Institute, Rondebosch, Cape Town, South Africa.

June 23-24 - Dr. Bradford Brown, Northeast Fisheries Center, at La Jolla Laboratory for discussions with Director Barrett.

29 - Mr. Martin Howell, staff member of the House Merchant Marine and Fisheries Committee. Center Director Barrett escorted Mr. Howell on a tour of the Center facilities.

- Manuel Garcia V., University of Baja California, Ensenada, Mexico.

Pacific Environmental Group

June 29 - Fred Kellenberger, SWFC, La Jolla, California.

Tiburon Laboratory

June 3 - Walter Kuhnhold, Institute of Marine Science, Kiel, West Germany.

8 - Roy Wahle, Columbia River Program, NMFS, Portland, Oregon.

14 - R. E. Johannes, Hawaii Institute of Marine Biology, Hawaii.

- Robert Huffer, Scripps Institute of Oceanography, La Jolla, California.

15 - Edmundo Mena, Under Secretary of Fisheries, Ecuador.

- Guido Conill, U.S. Department of State, Washington, D.C.

22 - Charles Peckham, Living Marine Resources, Inc. San Diego, California.

- Bill Dillon, California Department of Fish and Game, Yountville, California.

27 - Steven A. Schultz, California Department of Fish and Game, Mendocino, California.

- Tom Jow, California Department of Fish and Game, Menlo Park, California.

- Bob McAllister, California Department of Fish and Game, Menlo Park, California.

- Jerry Spratt, California Department of Fish and Game, Monterey, California.

- June 27 - Bernice Hammer, California Department of Fish and Game, Menlo Park, California.
- Dave Thomas, California Department of Fish and Game, Menlo Park, California.
- 28 - Don Aasted, NMFS, Honolulu, Hawaii.
- Stan Gallagher, San Francisco State University, San Francisco, California.
- 30 - Chris Fee, NMFS, Terminal Island, California.
- Fred Kellenberger, NMFS, La Jolla, California.

PERSONNEL

- April 10 - Jerry Wetherall, Supervisory Fishery Biologist (Research), promotion - Honolulu Laboratory.
- June 6 - J. Michael Smith, Biological Aid (Fisheries), temporary appointment - Honolulu Laboratory.
- 7 - Joan Roff, Library Technician, temporary appointment - La Jolla Laboratory.
- 10 - Joan Ziegler, Clerk-typist, resignation - Tiburon Laboratory
- 11 - Patricia A. Halliday, Coding Clerk, resignation - Honolulu Laboratory.
- 19 - Michael F. Adams, Industry Economist, career conditional appointment - Honolulu Laboratory.
- Robert B. Moffitt, Biological Aid (Fisheries), conversion to full time permanent - Honolulu Laboratory.
- Daniel E. Ralph, Fishery Biologist, transfer from Sandy Hook Laboratory - Tiburon Laboratory.
- 20 - Robert Rankin, Computer Programmer, EOD - La Jolla Laboratory.
- Earl Webber, Fishery Biologist, EOD - La Jolla Laboratory.
- James Lambert, Biological Technician, EOD - La Jolla Laboratory.
- 22 - Jeffrey O'Neill, Biological Technician, resignation - Tiburon Laboratory.

June 24 - Barbara J. Mc Clard, Data Transcriber, resignation - Honolulu Laboratory.

Hired under federal and state youth assistance programs for the summer of 1977, Carmen Lillo, Morgan Busby, Mike Jones, Bart Sevilla entered on duty this month with the SWFC's La Jolla Laboratory.

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